Prevention of Significant Air Quality Deterioration Review

Preliminary Determination

May 18, 2016

Facility Name: Interfor U.S. Inc. – Swainsboro Sawmill
City: Swainsboro
County: Emanuel
AIRS Number: 04-13-107-00011
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Review Conducted by:
State of Georgia - Department of Natural Resources
Environmental Protection Division - Air Protection Branch
Stationary Source Permitting Program

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SUMMARY

The Georgia Environmental Protection Division (EPD) has reviewed the application submitted by Interfor U.S. – Swainsboro Sawmill for a permit to increase the production capacity of the direct-fired batch drying kiln DK08. The proposed project will increase production from the existing batch drying kiln DK08 to 85 MMBF/year by improvements in lumber stacking and by changing the product mix. Interfor has also proposed to add a stack at each end of the existing direct-fired continuous drying kiln DK09.

The proposed project will result in an increase in emissions from the facility due to proposed increase in drying capacity for batch kiln DK08 to 85 MMBF/year. The facilitywide production of dried lumber will increase to 195 MMBF/year due to this proposed increase in production from batch kiln DK08. Interfor is not proposing any increase in the production capacity of the direct-fired continuous drying kiln DK09 from currently permitted levels.

The modification of the Interfor U.S. – Swainsboro Sawmill due to this project will result in an emissions increase in VOC total 50.1 tpy, PM-10 8.3 tpy, NOx – 3.8 tpy, HAPs 4.8 tpy, CO – 9.6 tpy, Methanol 2.8 tpy, Formaldehyde – 1 tpy. A Prevention of Significant Deterioration (PSD) analysis was performed for the facility for all pollutants to determine if any increase was above the "PSD significance" level. The VOC emissions increase was above the PSD significant level threshold of 40 tpy for a PSD major source for VOC. This was done by looking at the past (baseline) actual emission from the projected actual emission and the associated emission increases from the sawmill. Therefore only VOC is subject to New Source Review (NSR) under the PSD rules.

The Interfor U.S. – Swainsboro Sawmill is located in Emanuel County, which is classified as "attainment" or "unclassifiable" for SO_2, $PM_{2.5}$ and PM_{10}, NO_X, CO, and ozone (VOC).

The EPD review of the data submitted by Interfor U.S. – Swainsboro Sawmill related to the proposed modifications indicates that the project will be in compliance with all applicable state and federal air quality regulations.

It is the preliminary determination of the EPD that the proposal provides for the application of Best Available Control Technology (BACT) for the control of VOC from the batch drying kiln DK08 as required by federal PSD regulation 40 CFR 52.21(j).

The proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth has been shown to be inconsequential.

This Preliminary Determination concludes that an Air Quality Permit should be issued to Interfor U.S. – Swainsboro Sawmill for the modifications necessary to increase the production from the batch drying kiln DK08 to 85 MMBF/year and for increasing the facilitywide production to 195 MMBF/year.

Various conditions have been incorporated into the current Title V operating permit to ensure and confirm compliance with all applicable air quality regulations. A copy of the draft permit amendment is included in Appendix A. This Preliminary Determination also acts as a narrative for the Title V Permit amendment.

1.0 INTRODUCTION – FACILITY INFORMATION AND EMISSIONS DATA

On November 10, 2015, Interfor U.S. – Swainsboro Sawmill (hereafter Interfor - Swainsboro) submitted an application for an air quality permit to increase the permitted production from the batch drying kiln DK08. The facility is located at 8796 GA Highway 297 in Swainsboro, Emanuel County. This PSD permit application was updated by Brad James of Trinity Consultants on May 13, 2016.

Table 1-1: Title V Major Source Status

Pollutant	Is the Pollutant Emitted?	If emitted, what is the facility's Title V status for the Pollutant?		
		Major Source Status	Major Source Requesting SM Status	Non-Major Source Status
PM	Yes			✓
PM_{10}	Yes			✓
$PM_{2.5}$	Yes			✓
SO_2	Yes			✓
VOC	Yes	✓		
NO_x	Yes			✓
CO	Yes			✓
TRS	Yes			✓
H_2S	Yes			✓
Individual HAP	Yes	✓		
Total HAPs	Yes	✓		
Total GHGs	Yes			✓

Table 1-2 below lists all current Title V permits, all amendments, 502(b)(10) changes, and off-permit changes, issued to the facility, based on a review of the "Permit" file(s) on the facility found in EPD's Air Branch office in Atlanta.

Table 1-2: List of Current Permits, Amendments, and Off-Permit Changes

Permit Number and/or Off-Permit Change	Date of Issuance/ Effectiveness	Purpose of Issuance
2421-107-0011-V-04-0	June 13, 2013	Renewal Title V Permit

Based on the proposed project description and data provided in the permit application, the estimated incremental increases of regulated pollutants from the facility are listed in Table 1-3 below:

Table 1-3: Emissions Increases from the Project

Pollutant	Baseline Years	Potential Emissions Increase (tpy)	PSD Significant Emission Rate (tpy)	Subject to PSD Review
PM	4/14 to 3/16	6.4	25	No
PM_{10}	4/14 to 3/16	8.2	15	No
VOC	4/14 to 3/16	**51**	40	**Yes**
NO_X	4/14 to 3/16	5.55	40	No
CO	4/14 to 3/16	2.3	100	No
SO_2	4/14 to 3/16	1.0	40	No

The definition of baseline actual emissions is the average emission rate, in tons per year, at which the emission unit actually emitted the pollutant during any consecutive 24-month period selected by the facility within the 10-year period immediately proceeding the date a complete permit application was received by EPD. Interfor has selected the baseline period of April 2014 to March 2016. The net emission increases were calculated by subtracting the past actual emissions (based upon the annual average emissions from April 2014 to March 2016) from the future projected actual emissions of the batch drying kiln DK08 and associated emission increases from non-modified equipment. Table 1-4 details this emissions summary. The emissions calculations for Tables 1-3 and 1-4 can be found in detail in the facility's PSD permit application (see Tables 2-1 and Appendix A of the PSD Application No. TV- 40453). These calculations have been reviewed and approved by the Division.

Table 1-4: Net Change in Emissions Due to the Major PSD Modification

Pollutant	Increase from Modified equipment		Associated Units Increase (tpy)	Total Increase (tpy)
	Past Actual	Future Actual		
PM	12.7	17.6	1.5	6.4
PM-10	19.8	27.3	0.7	8.2
PM-2.5	10.1	13.9	0.5	4.3
VOC	134	185		**51**
NO_X	11.8	16.3		4.5
CO	6.1	8.4		2.3
SO_2	2.5	3.5		1.0
HAPS	10.2	14.1		3.9

Based on the information presented in Tables 1-3 and 1-4 above, Interfor - Swainsboro's proposed modification, as specified per Georgia Air Quality Application No. TV-40453, is classified as a major modification under PSD because the potential emission increase of VOC is greater than the PSD significant emission rate (SER) of 40 tons per year for a major PSD modification of an existing PSD major source.

Through its new source review procedure, EPD has evaluated Interfor - Swainsboro's proposal for compliance with State and Federal requirements. The findings of EPD have been assembled in this Preliminary Determination.

2.0 PROCESS DESCRIPTION

According to the PSD Application No. TV-40453, Interfor - Swainsboro has proposed to increase production from the batch drying kiln DK08 and to add a stack to each end of the continuous drying kiln DK09.

The plant had previously received authorization from Georgia EPD in July 2007 to convert its existing batch kiln DK08 into a direct-fired continuous kiln (DK-10) with a projected production of 110 MMBF/year, this conversion never occurred and this project has been tabled and will not occur now unless the mill decides to pursue it in the future at which time a new permit application will be submitted for the EPD's consideration. Drying kiln DK08 is expected to continue to operate as a batch kiln for the foreseeable future with increased drying capacity of 85 MMBF/year.

Interior's Swainsboro sawmill processes roundwood stored in the woodyard through the sawmill to produce finished wood product (dried lumber) loaded for shipment. Logs are debarked, sawn, kiln dried, planed, and bundled for shipment as manufactured dimensional lumber.

The sawmill operates the batch kiln (DK08) and continuous kiln (DK09) with a currently permitted combined dry kiln operating capacity of 169,219,500 BF/year effective until the conversion of DK08 into a continuous kiln DK10 would be completed which will not occur now due to change in plans.

The facility has proposed to increase production in existing batch kiln DK08 by changing the product mix and the way the lumber is stacked in the kiln and has proposed to increase production in kiln DK08 to 85 MMBF/year by submitting this PSD application. The mill's permitted production limit will increase from 169,219,500 to 195,000,000 BF per year after the proposed modification. The facility will also be adding a powered stack to each end of the existing direct-fired continuous kiln DK09 to assure compliance with the ambient air toxic regulations.

Both existing direct-fired drying kilns have their own gasifier with bypass stack, combustion unit, and blend chamber. The units gasify sawdust in a specially designed retort. The gas is burned to supply the heat needed to dry green lumber in the drying kilns. The bypass stack is only used during startup, shutdown, malfunction and while loading and unloading the kiln, and not during normal operation of the kiln. Wood is rolled into the kilns on rail cars where it takes 22 to 24 hours to dry from an approximate moisture content of 50 percent down to 19 percent.

The sawing and chipping operation produces chips, which are sent to a chip bin for shipment offsite, and also produces green sawdust, which is pneumatically sent to a bin with a cyclone. The green sawdust is used for fuel in the kiln gasifiers. Dried dimensional lumber is sent to a planer mill where it is sized to specification. The planning operation produces shavings, which are pneumatically sent to a shavings bin, which has a cyclone and baghouse control device for PM control. In addition to the kilns, the facility has equipment for green log receiving and debarking, sawing and chipping of green logs, a chip bin, a sawdust bin with cyclone, a planer mill, a shavings bin with a cyclone followed by a baghouse, conveyors, a storage area for dimensional lumber, and other related equipment.

The Interfor - Swainsboro's permit application and supporting documentation are included in Appendix A of this Preliminary Determination and can be found online at https://geos.epd.georgia.gov/GA/GEOS/Public/Public/Pages/PublicApplicationList.aspx

3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

State Rules

The lumber drying kilns emit PM, which are regulated by GA Rule 391-3-1-.02(2)(e) "Particulate Emissions from Manufacturing Processes".

The allowable PM emissions rate for existing equipment and new equipment with a process rate up to 30 tons per hour is expressed by the following equation: $E = 4.1P^{0.67}$, where E equals the allowable PM emission rate in lb/hr and P equals the maximum process input weight in Tons per hour. Equipment in operation or under construction contract on or before July 2, 1968 is considered existing equipment.

Based on the wet weight of green lumber of 5 lb/BF and a maximum production rate of 10.2 MBF/hr (wet lumber) through the batch drying kiln DK08, the maximum process input weight for the drying kiln DK08 is 25.5 TPH. Therefore, the kiln is subject to a maximum PM allowable emissions rate as calculated below:

$$E = 4.1P^{0.67} = 4.1\ (25.5)^{0.67} = 35.91 \text{ lb/hr}$$

The lumber dry kilns are also subject to GA Rule 391-3-1-.02(2)(b), which states that the kiln must comply with a 40% opacity limit. In addition, the kilns must meet the 2.5 percent sulfur limit for fuel burning (saw dust burning), as expressed in GA Rule 391-3-1-.02(2)(g). All these are existing rules that apply to all drying kilns including the kiln DK08 and will continue to apply after the proposed project modification.

Federal Rule - PSD

The PSD review requirements apply to any new or modified source which belongs to one of 28 specific source categories having potential emissions of 100 tons per year or more of any regulated pollutant, or to all other sources having potential emissions of 250 tons per year or more of any regulated pollutant.

They also apply to any modification of a PSD major stationary source which results in a significant net emission increase of any regulated (PSD) pollutant.

The PSD regulations require that any major stationary source or major modification subject to the regulations meet the following requirements:

- Application of BACT for each regulated pollutant (for each source) that would be emitted in significant amounts (greater than SER) ;
- Analysis of the ambient air impact;
- Analysis of the impact on soils, vegetation, and visibility;
- Analysis of the impact on Class I areas; and
- Public notification of the proposed plant in a newspaper of general circulation

Definition of BACT

The PSD regulation requires that BACT be applied to all regulated air pollutants emitted in significant amounts (amounts exceeding significant emission rates (SER)). Section 169 of the Clean Air Act defines BACT as an emission limitation reflecting the maximum degree of reduction that the permitting authority (in this case, EPD), on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such a facility through application of production processes and available methods, systems, and techniques. In all cases BACT must establish emission limitations or specific design characteristics at least as stringent as applicable New Source Performance Standards (NSPS). In addition, if EPD determines that there is no economically reasonable or technologically feasible way to measure the emissions, and hence to impose and enforceable emissions standard, it may require the source to use a design, equipment, work practice or operations standard or combination thereof, to reduce emissions of the pollutant to the maximum extent practicable.

EPA's NSR Workshop Manual includes guidance on the 5-step top-down process for determining BACT. In general, Georgia EPD requires PSD permit applicants to use the top-down process in the BACT analysis, which EPA reviews. The five steps of a top-down BACT review procedure identified by EPA per BACT guidelines are listed below:

Step 1: Identification of all control technologies;
Step 2: Elimination of technically infeasible options;
Step 3: Ranking of remaining control technologies by control effectiveness;
Step 4: Evaluation of the most effective controls and documentation of results; and
Step 5: Selection of BACT.

The following is a discussion of the applicable federal rules and regulations pertaining to the drying kiln DK08 that is the subject of this preliminary determination, which is then followed by the top-down BACT analysis.

New Source Performance Standards

No federal NSPS exists for direct-heated batch or continuous drying kiln at the Interfor's Swainsboro sawmill.

National Emissions Standards For Hazardous Air Pollutants

On July 30, 2004, EPA promulgated final MACT standards for the Plywood and Composite Wood Products (PCWP) source category (40 CFR 63, Subpart DDDD). PCWP facilities are defined to include lumber drying kilns located at sawmills. Although lumber drying kilns are subject to the MACT, there are no emission limits or work practice standards for lumber kilns included in the final rule for lumber drying kilns at sawmills in the PCWP MACT.

State and Federal – Startup and Shutdown and Excess Emissions

Excess emission provisions for startup, shutdown, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. The facility cannot anticipate or predict malfunctions. However, the facility is required to minimize emissions during periods of startup, shutdown, and malfunction. The facility is required to follow the work practices requirements and the operations and maintenance plan for the drying kilns including kiln DK08 in order to minimize malfunction events and minimize excess emissions during such events. The facility is also required to record and report such events and state if the steps and measures taken to minimize emissions were consistent with the operations and maintenance plan during startup, shutdown and malfunction.

Federal Rule – 40 CFR 64 – Compliance Assurance Monitoring

Under 40 CFR 64, the *Compliance Assurance Monitoring* Regulations (CAM), facilities are required to prepare and submit monitoring plans for certain emission units with the Title V application. The CAM Plans provide an on-going and reasonable assurance of compliance with emission limits. Under the general applicability criteria, this regulation applies to units that use a control device to achieve compliance with an emission limit and whose pre-controlled emissions levels exceed the major source thresholds under the Title V permitting program. Although other units may potentially be subject to CAM upon renewal of the Title V operating permit, such units are not being modified under the proposed project and need not be considered for CAM applicability at this time.

Therefore, this applicability evaluation only addresses the drying kiln DK08, which does not employ any air pollution control devices; therefore, the CAM requirements are not triggered by the proposed modification. CAM requirements do not apply to the existing drying kilns at Interfor's Swainsboro sawmill.

4.0 CONTROL TECHNOLOGY REVIEW

The proposed project will result in emissions that are significant enough to trigger PSD review for volatile organic compounds (VOC).

Batch Drying Kiln DK08- Background

The batch drying kilns (Source Code DK08) dries lumber from the sawmill in batches. The drying kiln does not have any pollution control equipment. VOC are emitted from vents on kiln roof.

Batch Drying Kiln DK08 – VOC Emissions

Interfor's Proposal

The only pollutant required to be evaluated for this project for PSD review is VOC and the only modified emission unit is a direct fired batch drying kiln DK08.

Potentially applicable emission control technologies were investigated by reviewing the EPA's RACT/BACT/LAER Clearinghouse (RBLC) control technology database, technical literature, control equipment vendor information and by using process knowledge and engineering experience.

The RBLC lists control technologies that have been approved in PSD permits issued by state regulatory agencies as BACT for numerous process units. Process units in the database are grouped into categories by industry type.

Step 1 – Identification of Potential Control Techniques:

The applicant has suggested the following BACT for control of VOC emissions. An analysis of these technologies can be found in Section 5 (pages 24 through 36) of the application.

While add-on controls have not been demonstrated for lumber drying kilns, the following control technologies have been demonstrated to remove VOC emissions for other industrial processes:

- Wet electrostatic precipitator (WESP) followed by Thermal Oxidation (RTO)
- WESP followed by Catalytic Oxidation
- Condensation
- Carbon Adsorption
- Wet Scrubbing
- Biofiltration
- Proper Kiln Design and Operation

The Division has reviewed Step 1 of the applicant's analysis and the Division agrees with the findings.

Step 2 – Elimination of Technically Infeasible Control Options:

- Wet electrostatic precipitator (WESP) followed by Catalytic Oxidation is not feasible due to the potential for blinding and poisoning of the catalyst. Blinding occurs when particulates build-up and coat the catalyst. Blinding prevents oxidation of VOC emissions in catalyst. Poisoning occurs when heavy metals in the gas stream become chemically bound to the catalyst and reduce the surface area for oxidation of VOC emissions. The applicant's analysis can be found on page 32 of the PSD permit application...
- Condensation is not feasible because of the low temperature required of the exhaust stream with the potential of freezing the water vapor in the gas stream. The applicant's analysis can be found on page 33 of the PSD permit application.
- Carbon Adsorption is not feasible because of the high humidity of the exhaust stream. The applicant's analysis can be found on page 33 of the PSD permit application.

- Wet Scrubbing is not feasible because of this requires water soluble VOC compounds to be controlled and the constituents of the gas stream are not water soluble. The adsorption media could easily be plugged. The applicant's analysis can be found on page 33.
- Biofiltration is not feasible due to the inconsistent flow of the exhaust stream and also the potential to buildup insoluble VOC compounds within the biofilter bed which could plug the media. The applicant's analysis can be found on page 34.

The Division agrees with the applicant that the use of wet electrostatic precipitator (WESP) followed by catalytic oxidation, condensation, carbon adsorption, wet scrubbing and biofiltration are technically infeasible.

Because wet electrostatic precipitator (WESP) followed by thermal oxidation was found to be technically feasible, it was evaluated further for BACT

Step 3 – Rank of Remaining Control Technologies:

The following is a ranking of the control technologies based on control effectiveness found on page 34 of the application.

Table 4-1: Efficiency Ranking of Feasible Control Technologies

Rank	Control Technology	Potential Control Efficiency (%)
1	Wet Electrostatic Precipitator (WESP) followed by Regenerative Thermal Oxidizer (RTO)	95%
2	Proper Maintenance and Work Practices	Base Case

The list also includes "Proper Maintenance and Work Practices." The efficiency of this method varies according to industry.

The Division agrees with the applicant that the RTO is ranked as the most effective control technology to use with the drying kilns for VOC control.

Step 4 – Evaluation of Most Stringent Controls:

The applicant provided an analysis of the wet electrostatic precipitator (WESP) followed by thermal oxidation on pages 34 through 36 of the application. The applicant calculated the annualized cost of the RTO and WESP as $28,000 per ton of VOC removed. The cost of the RTO and WESP exceeds the benefit of the VOC reduction.

The Division agrees with the applicant that the RTO and WESP control costs exceed the benefit of the VOC reduction.

Step 5 – Selection of BACT:

The applicant has determined BACT as Proper Maintenance and Work Practices. Pages 36 and 37 in the application describe the BACT selection.

The applicant will use a VOC emission factor of 4.28 lb/MBF to calculate VOC emissions from the continuous direct-fired lumber kiln DK08. Interfor will have a 85 MMBF/year production limit for Drying kiln DK08 and facilitywide production limit of 195 MMBF/year. This limit is based on potential throughput for the continuous direct-fired lumber kiln per year.

BACT is generally an emission limit. However in the case of continuous kilns which are an emerging technology, enough test data does not exist to impose a limit on the facility. Therefore, BACT in this case is not a numerical value but proper maintenance and work practices. Work practices will include proper maintenance and minimizing over-drying.

Proper Kiln Design and Operation

The naturally-occurring VOCs in the lumber are driven-off by the heat used to dry the lumber within the kiln. Lumber is dried to specific moisture content for quality control purposes. Proper design and operation of the lumber kilns prevents over drying of the lumber that may release additional VOCs to the atmosphere. As a result, proper operation of the kilns will minimize VOC emissions to the atmosphere. This is Interfor's proposal for the VOC control from the batch drying kiln DK08.

Interfor has proposed a VOC emission limit of 4.28 lb/MBF (as carbon) as BACT. This BACT limit applies during all operating conditions as there are no significant changes to the VOC emissions generated by the kiln during startup and shutdown compared to normal operation. This VOC emission rate is consistent with the NCASI VOC emissions rate from lumber drying kilns drying yellow southern pine.

The proposed BACT work practices for the lumber kiln consist of (1) proper kiln maintenance and (2) minimizing over-drying while meeting the relevant lumber moisture specifications (target final lumber moisture content of 12 percent or greater as measured at the planer mill outfeed).

Interfor proposes to demonstrate compliance with the work practices by measuring the moisture content of the lumber as it comes out of the planer mill and following a preventative maintenance plan will also assist in minimizing VOC emissions.

Interfor proposes to develop and implement a maintenance plan within 180 days of start-up of the modified kiln DK08. This proposal is consistent with recent BACT determinations in EPA Region 4

EPD Review – VOC Control

The cost of controlling VOCs with an RTO and WESP is estimated at approximately $28,000 per ton of VOC removed for a direct-fired batch kiln. This cost is excessive for this technology to be considered economically feasible.

The facility is located in a lightly populated and developed area of Georgia and ambient concentrations of ozone in this area are in attainment with the NAAQS for this pollutant.

Results of the top-down BACT analysis indicate that there are no demonstrated control techniques in practice, numerous technical challenges, and no cost-effective control technologies for removing VOC emissions from lumber drying kilns and consequently, the BACT proposed for the lumber kiln is "no additional add on control" with the use of "proper design and operating practices such as optimum drying of the lumber and maintenance of the optimum moisture level in the dried wood" is determined to be BACT for VOC for the lumber drying kiln DK08.

Conclusion – VOC Control

It should also be noted that VOC emissions from the lumber kilns are small compared to the biogenic (naturally occurring) VOC emissions from forests in the vicinity of the facility and, consequently, any reduction of VOC emissions from the lumber kilns will have a negligible effect upon ozone formation and concentrations in the area while an increase in NOx concentrations generated by the control equipment could actually increase ozone levels.

Interfor operates a number of lumber drying kilns across the US. None of the lumber kilns at any of Interfor's manufacturing facilities utilize controls to remove VOCs. In addition, to the best of Interfor's and EPD's knowledge, no lumber kilns operating in the US utilize controls to remove VOCs.

The BACT selection for the batch drying kiln DK08 is no additional add on control for removing VOC from the drying kiln exhaust, proper operation and maintenance of the drying kiln, maintenance of the drying level in the lumber by maintaining proper moisture content in the dried lumber.

The compliance method is proper maintenance and operation of the drying kiln DK08 and monitoring of the moisture level of the dried lumber as it comes out of the planer mill.

5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements:

There are no applicable testing requirements being imposed since there is no VOC BACT emission limit for the lumber drying kiln DK08.

Monitoring Requirements:

No applicable monitoring requirements are imposed on drying kiln DK08 since Interfor will follow the site-specific operation and maintenance plan and will closely monitor the moisture content of the dried lumber as it comes out of the planer mill thereby ensuring optimum control of VOC emissions from the lumber drying kiln DK08. The Permittee will also closely monitor the burner temperature in the dryer burner/gasifier and the temperature in the blend box and the kiln inlet and outlet temperatures.

CAM Applicability:

Because, CAM is not applicable and is not being triggered by the proposed modification. Therefore, no CAM provisions are being incorporated into the facility's permit. CAM is not applicable since there is no VOC emission limit/standard and the drying kiln has no control device for VOC control.

6.0 AMBIENT AIR QUALITY REVIEW

An air quality analysis is required to determine the ambient impacts associated with the operation of the proposed modification. The main purpose of the air quality analysis is to demonstrate that emissions emitted from the proposed modification, in conjunction with other applicable emissions from existing sources (including secondary emissions from growth associated with the new project), will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD increment in a Class I or Class II area. NAAQS exist for NO_2, CO, $PM_{2.5}$, PM_{10}, SO_2, Ozone (O_3), and lead. PSD increments exist for SO_2, NO_2, and PM_{10}.

The proposed project at the Swainsboro sawmill triggers PSD review for VOC. An air quality analysis was conducted to demonstrate the facility's compliance with the NAAQS and PSD Increment standards for VOC. An additional analysis was conducted to demonstrate compliance with the Georgia air toxics program.

This section of the preliminary determination discusses the air quality analysis requirements, methodologies, and results. Supporting documentation may be found in the Air Quality Dispersion Report of the application and in the additional information packages.

No PSD de minimis monitoring concentration exists for VOC, however, an increase in VOC emissions of 100 TPY or more requires analysis for O3. The predicted increase in VOC emissions due to the proposed modification is less than 100 TPY.

Modeling Requirements

The air quality modeling analysis was conducted in accordance with Appendix W of Title 40 of the Code of Federal Regulations (CFR) §51, *Guideline on Air Quality Models*, and Georgia EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised).*

The proposed project will cause net emission increases of VOC that is greater than the applicable PSD Significant Emission Rates (SER).
Therefore, air dispersion modeling analyses are required to demonstrate compliance with the NAAQS and PSD Increment. TRS and VOC do not have established PSD modeling significance levels (MSL) (an ambient concentration expressed in either $\mu g/m^3$ or ppm). Therefore, modeling is not required for VOC emissions; however, the project will likely have no impact on ozone attainment in the area based on data from the monitored levels of ozone in Augusta, Richmond County and the level of emissions increases that will result from the proposed project. The southeast is generally NO_X limited with respect to ground level ozone formation.

Significance Analysis: Ambient Monitoring Requirements and Source Inventories

Initially, a Significance Analysis was conducted to determine if the VOC emissions increases at the Interfor's Swainsboro sawmill would significantly impact the area surrounding the facility. Maximum ground-level concentrations are compared to the pollutant-specific U.S. EPA-established Significant Impact Level (SIL). SIL is not prescribed for VOC.

If a significant impact (i.e., an ambient impact above the SIL) does not result, no further modeling analyses would be conducted for that pollutant for NAAQS or PSD Increment. There is no SIL for VOC. Therefore no pre-construction ambient monitoring is required for the proposed modification.

NAAQS Analysis

The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of pollutant in the atmosphere, which define the "levels of air quality which the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health."
Secondary NAAQS define the levels that "protect the public welfare from any known or anticipated adverse effects of a pollutant." The primary and secondary NAAQS do not exist for VOC.

PSD Increment Analysis

The PSD Increments were established to "prevent deterioration" of air quality in certain areas of the country where air quality was better than the NAAQS.
To achieve this goal, U.S. EPA established PSD Increments for certain pollutants. The sum of the PSD Increment concentration and a baseline concentration defines a "reduced" ambient standard, either lower than or equal to the NAAQS that must be met in an attainment area. Significant deterioration is said to have occurred if the change in emissions occurring since the baseline date results in an off-property impact greater than the PSD Increment (i.e., the increased emissions "consume" more than the available PSD Increment).

U.S. EPA has established PSD Increments for NO_X, SO_2, and PM_{10}; no increments have been established for CO, $PM_{2.5}$ (however, $PM_{2.5}$ increments are expected to be added soon) or VOC.

Modeling Methodology

Details on the dispersion model, including meteorological data, source data, and receptors can be found in EPD's PSD Dispersion Modeling and Air Toxics Assessment Review in Appendix C of this Preliminary Determination and in Section 8.1 of the permit application.
As noted previously, the VOC *de minimis* concentration is mass-based (100 tpy) rather than ambient concentration-based (ppm or $\mu g/m^3$). Projected VOC emissions increases resulting from the proposed modification do not exceed 100 tpy; however, the current Georgia EPD ozone monitoring network (which includes monitors in Augusta (Bungalow road) provides sufficient ozone data such that no pre-construction or post-construction ozone monitoring is necessary.

Class I Area Analysis

Federal Class I areas are regions of special national or regional value from a natural, scenic, recreational, or historic perspective. Class I areas are afforded the highest degree of protection among the types of areas classified under the PSD regulations. U.S EPA has established policies and procedures that generally restrict consideration of impacts of a PSD source on Class I Increments to facilities that are located near a federal Class I area. Historically, a distance of 100 km has been used to define "near", but more recently, a distance of 200 kilometers has been used for all facilities that do not combust coal.

The nearest Class I Area to the facility, the Okefenokee National Wilderness Area (NWA), is more than 160 kilometers away. The magnitude of the emissions from the proposed project do not warrant a review of impacts at this distance. Therefore, no Class I Increment consumption of Air Quality Related Values (AQRV) analyses were performed.

There are two Class I areas within approximately 200 kilometers of the Swainsboro sawmill, these are the Okefenokee National Wilderness area (NWA) and the Wolf Island National Wilderness Refuge (NWR), located approximately 161 and 159 kilometers south and southeast of the facility; The U.S. Fish and Wildlife Service (FWS) is the designated Federal Land Manager (FLM) responsible for oversight of all of these two Class I areas.

Due to the low VOC increases from the proposed project in both Class I areas, less than 1 percent in the Wolf Island NWR and less than 1 percent in the Okefenokee NWA, the effects of O_3 as a result of VOC emissions from the project are expected to be insignificant.

7.0 ADDITIONAL IMPACT ANALYSES

PSD requires an analysis of impairment to visibility, soils, and vegetation that will occur as a result of a modification to the facility and an analysis of the air quality impact projected for the area as a result of the general commercial, residential, and other growth associated with the proposed project.

Soils and Vegetation

According to the Emanuel County Soil Survey (1993), the soils in the vicinity of the Interfor Sawmill are dominated by Fuquay loamy sand, with Dothan loamy sand and Tifton loamy sand also present in large quantities. Kinston and Bibb soils make up a smaller portion of the soils. The Fuquay loamy sand, Dothan loamy sand, Tifton loamy sand, and Kinston and Bibb soils are described in the Emanuel County Soil Survey and a detail description of these soil types is in the PSD permit application Section 6.1.2 (page 53 and 54).

The maximum O_3 concentrations in the vicinity of the site are currently below the AAQS (refer to Section 4.2). The proposed project represents approximately a 1.6 percent increase in regional VOC emissions (refer to Section 6.1.3). Therefore, the effects of O_3, as a result of VOC emissions from the proposed project, are expected to be insignificant, and no detrimental effects on soils should occur in the vicinity of the Interfor Swainsboro Sawmill.

Total VOC emissions in the region (i.e., Bulloch, Burke, Emanuel, Laurens, and Toombs Counties) are approximately 12,818 TPY for stationary and mobile sources [EPA Air Data County Emissions Map for 1999]. The maximum VOC emissions due to the facility are 413 TPY, which represents less than a 4 percent increase in regional VOC emissions. Therefore, no adverse effects on vegetation due to the project's VOC emissions are expected.

In summary, the phytotoxic effects from the project's emissions are minimal. It is important to note that the elements were conservatively analyzed with the assumption that 100 percent was available for plant uptake. This is rarely the case in a natural ecosystem.

Growth

The proposed increase in the throughput of the lumber drying kiln DK08 is not expected to contribute to growth and increased VOC emissions from the associated growth. Therefore the growth effects on the air quality in the neighborhood of the Interfor's Swainsboro sawmill is expected to be negligible.

Visibility

Visibility impairment is any perceptible change in visibility (visual range, contrast, atmospheric color, etc.) from that which would have existed under natural conditions. Poor visibility is caused when fine solid or liquid particles, usually in the form of volatile organics, nitrogen oxides, or sulfur oxides, absorb or scatter light.

This light scattering or absorption actually reduces the amount of light received from viewed objects and scatters ambient light in the line of sight. This scattered ambient light appears as haze.

Another form of visibility impairment in the form of plume blight occurs when particles and light-absorbing gases are confined to a single elevated haze layer or coherent plume. Plume blight, a white, gray, or brown plume clearly visible against a background sky or other dark object, usually can be traced to a single source such as a smoke stack.

Visibility is an AQRV for the Wolf Island NWR and Okefenokee NWA. Visibility can take the form of plume blight for nearby areas, or regional haze for long distances (e.g., distances beyond 50 km). Because the Wolf Island NWR and Okefenokee NWA lie more than 50 km from the Interfor Swainsboro Sawmill, the change in visibility is analyzed as regional haze. However, since PM_{10} and NO_X emissions are not predicted to be large, an analysis of regional haze is not included for the proposed project.

Georgia Toxic Air Pollutant Modeling Analysis

Georgia EPD regulates the emissions of toxic air pollutant (TAP) emissions through a program covered by the provisions of *Georgia Rules for Air Quality Control*, 391-3-1-.02(2)(a)3.(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the Georgia EPD's review of TAP emissions as part of air permit reviews are contained in the agency's "*Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised).*"

Selection of Toxic Air Pollutants for Modeling

For projects with quantifiable increases in TAP emissions, an air dispersion modeling analysis is generally performed to demonstrate that off-property impacts are less than the established Acceptable Ambient Concentration (AAC) values. The TAP evaluated is restricted to those that may increase due to the proposed project. Thus, the TAP analysis would generally be an assessment of off-property impacts due to facility-wide emissions of any TAP emitted by a facility. To conduct a facility-wide TAP impact evaluation for any pollutant that could conceivably be emitted by the facility is impractical. A literature review would suggest that at least one molecule of hundreds of organic and inorganic chemical compounds could be emitted from the various combustion units. The vast majority of compounds potentially emitted however are emitted in only trace amounts that are not reasonably quantifiable.

Emissions from a new project at the Interfor Facility in Swainsboro, Georgia require an assessment for compliance to be conducted in accordance with the EPD TAP modeling procedures. The calculations for this assessment were carried out by PLE Consulting and forwarded to Koogler & Associates, Inc. for air quality modeling. The pollutants of concern include methanol, formaldehyde, phenol, acetaldehyde, acrolein, propionaldehyde, methyl isobutyl ketone (MIK), benzene, o-xylene, and toluene. To carry out an adequate determination of the influences these TAP increases may contribute to surrounding air quality, air dispersion modeling was carried out. This modeling effort utilized EPA's AERMOD model, with the v.14134 executable.

For each TAP identified for further analysis, both the short-term and long-term AAC were calculated following the procedures given in Georgia EPD's *Guideline*. Figure 8-3 of Georgia EPD's *Guideline* contains a flow chart of the process for determining long-term and short-term ambient thresholds. Interfer's Swainsboro sawmill referenced the resources previously detailed to determine the long-term (i.e., annual average) and short-term AAC (i.e., 24-hour or 15-minute). The AACs were verified by the EPD.

Determination of Toxic Air Pollutant Impact

Note that per the Georgia EPD's *Guideline*, downwash was not considered in the TAP assessment.

Initial Screening Analysis Technique

Generally, an initial screening analysis is performed in which the total TAP emission rate is modeled from the stack with the lowest effective release height to obtain the maximum ground level concentration (MGLC). Note the MGLC could occur within the facility boundary for this evaluation method. The individual MGLC is obtained and compared to the smallest AAC. Due to the likelihood that this screening would result in the need for further analysis for most TAP, the analyses were initiated with the secondary screening technique.

PLE Consulting determined that two sources from this facility would be emitting TAPs to the atmosphere. These sources include Dry Kiln 08 and Dry Kiln 09 (referenced as DK08 and DK09 from henceforth, respectively). The emissions from DK08 come from several vents located along the top of the building that houses the kiln. To simplify the modeling procedures, the entirety of the flow and emissions were assumed to come from one equivalent vent placed at the middle of the kiln building. For DK09, the emission points will be two powered stacks on either end of the kiln building. The stack heights and diameters of these two stacks are shown below. As indicated in conversations with GA EPD, dispersion modeling included facility-wide emissions, and not just project based emission increases. In such a scenario, background concentrations do not need to be considered.

The locations, release height, gas exit temperature, stack inside diameter and gas exit flow rate for each source is summarized below:

Source ID	X,Y UTM Coordinates [m]	Release Height [ft.]	Gas Exit Temperature [F]	Stack Inside Diameter [ft]	Gas Exit Flow Rate [ft^3/min]	Exit Velocity [m/s]
DK08	374907, 3597710	35	240	5.657	3,818	2.532
DK09a	374942, 3597729	40	100	2.35	20,000	31.037
DK09b	374943, 3597695	40	100	2.35	20,000	31.037
DK09ad	374942, 3597729	8	140	19.15	1,500	0.026
DK09bd	374943, 3597695	8	140	19.15	1,500	0.026

Note that Source ID DK09ad and DK09bd represent emission through the doors of the continuous kiln DK09. Emissions from DK09 are split on an 80/20 basis with 80% of the emissions being discharged from the powered stacks and 20% of the emissions being discharged out the kiln doors. The kiln emissions were split 80/20 on a lb/hr basis. If the fans were not in place, the total flow out each end of the kiln would be 7,500 ACFM.

Under this scenario, the flow out the doors on each end would be 20% of the 7,500 ACFM, or 1,500 ACFM. the airflows modeled from the kiln doors were based on 1,500 ACFM discharging through each door and 20,000 ACFM being pulled up each stack by the powered fans. Note that the powered stack result in a lowering of the temperature of the stack emissions to 100 degree F.

The emission rate of each modeled TAP from DK08 and DK09 are summarized below. The emissions from DK09a and DK09b will be half of these values. These values are reported on a ton per year basis (TPY).

Source ID	Methanol	Formaldehyde	Phenol	Acetaldehyde	Acrolein
DK08	8.245	3.145	0.438	1.785	0.255
DK09	10.560	3.245	0.567	2.310	0.330
Source ID	**Propionaldehyde**	**MIK**	**Benzene**	**o-Xylene**	**Toluene**
DK08	0.124	0.096	0.021	0.009	0.004
DK09	0.160	0.125	0.027	0.011	0.006

A summary of these AAC values, for each of the modeled pollutants, follows:

Source ID	15-Minute AAC [µg/m^3]	24-Hour AAC [µg/m^3]	Annual AAC [µg/m^3]
Methanol	32,800	619	NA
Formaldehyde	245	NA	1.1
Phenol	6,000	45.2	NA
Acetaldehyde	4,500	NA	4.55
Acrolein	23	NA	0.15
Propionaldehyde	NA	NA	8
MIK	30,700	NA	3,000
Benzene	1,600	NA	0.13
o-Xylene	65,500	NA	100
Toluene	113,000	NA	5,000

The dispersion modeling results from this analysis is summarized in the table below. Each modeled value represents the maximum concentration for each averaging time, outside the boundaries of the facility. In accordance with The Toxics Guideline, 1-hour model results were multiplied by 1.32 for comparison to the 15-minute AAC. Each pollutant was individually modeled by AERMOD to eliminate the assumption of a linear relationship between facility emissions and resulting concentrations. Interfor evaluated/modeld concentrations of air toxics at the nearby County Solid Waste Facility and at five nearby residences, which encircle the plant, in addition to the standard fenceline modeling since MGLC for average annual Formaldehyde values exceeded the annual average AAC and MGLC for the annual average Acrolein concentration at the fenceline was almost equal to the annual average AAC. Therefore, a site specific risk assessment was carried out, which provided for more accurate assessment of the risk in rural environments.

GA EPD remodeled the impact of two TAPs - Formaldehyde and Acrolein using 0.001 m/s for horizontal emission via kiln doors.

The results show that the MGLCs increase by 10-15% at annual and 24-hour averaging periods and 25-35% at 15-min averaging period, listed in parentheses in Tables 1 and 2. Tables 1 and 2 include the MGLCs at the county solid waste facility and highest of 5 nearby residences.

All of the modeling results indicated ambient concentrations below the AAC for all pollutants at all receptors, with the exception of the annual AAC for formaldehyde at the fenceline. This issue is primarily related to the topography of the area and proximity of the formaldehyde sources as they relate to the fenceline.

The closest structure to the site is a County owned Solid Waste Facility; and the modeling indicates compliance with all AACs at this facility. Five nearby residences were then chosen at various points on the compass, circling the Interfor plant, and modeling was performed to evaluate concentrations that might occur at those residences. All modeled concentrations at the residences were well below the AACs.

Based on the attached data, the Site Specific Risk Assessment concludes that all concentrations of the TAPs are within acceptable limits.

Modeled MGLCs and the Respective AACs at 15-min Averaging Period

TAP	Averaging Period	AAC [µg/m^3]	MGLC [µg/m^3]	County Solid Waste Facility [µg/m^3]	Highest of 5 Nearby Residences [µg/m^3]
Methanol	15-min	32,800	241	127	129
Formaldehyde	15-min	245	81.4 (103.3)	44.2 (56.8)	43.5 (45.7)
Phenol	15-min	6,000	12.9	6.78	6.90
Acetaldehyde	15-min	4,500	52.6	27.7	28.2
Acrolein	15-min	23	7.50 (9.78)	3.95 (5.35)	4.02 (4.24)
Propionaldehyde	15-min	NA	3.67	1.93	1.96
MIK	15-min	30,700	2.87	1.51	1.53
Benzene	15-min	1,600	0.612	0.32	0.33
o-Xylene	15-min	65,500	0.272	0.14	0.14
Toluene	15-min	113,000	0.116	0.06	0.06

Modeled MGLCs and the Respective AACs at Annual and 24-hr Averaging Periods

TAP	Averaging Period	AAC [µg/m^3]	MGLC [µg/m^3]	County Solid Waste Facility [µg/m^3]	Highest of 5 Nearby Residences [µg/m^3]
Methanol	24-hr	619	49.8	12.6	10.5
Formaldehyde	Annual	1.1	1.64 (**1.88**)	0.342 (0.39)	0.205 (0.224)
Phenol	24-hr	45.2	2.66	0.673	0.559
Acetaldehyde	Annual	4.55	1.05	0.216	0.130
Acrolein	Annual	0.15	0.149 (**0.174**)	0.031 (0.036)	0.019 (0.020)
Propionaldehyde	Annual	8	0.073	0.015	0.009
MIK	Annual	3,000	0.057	0.012	0.007
Benzene	Annual	0.13	0.012	0.003	0.002
o-Xylene	Annual	100	0.005	0.001	0.001
Toluene	Annual	5,000	0.002	0.000	0.000

As seen, all of the pollutants have modeled values below the allowable AAC limits.

The air quality analysis reviewed and described in the above sections demonstrates the conformance of the project's air pollutant impacts with Class I and Class II PSD NAAQS regulations and GA EPD's Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions. The additional air quality impact on soil, vegetation, and visibility is expected to be very minimal.

Spatial plots for the annual acetaldehyde and Acrolein results are shown in Attachment 1. These figures demonstrate the general dispersion of pollutants from the facility and the isopleths of the modeled concentrations. Orange dots represent five nearby residences and the blue dot represents the county solid waste facility**.**

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 2421-107-0011-V-04-1. Interfor has proposed not to convert the batch drying kiln DK08 into a continuous kiln and to increase production from this kiln to 85 MMBF/year.

Section 1.0: Facility Description

Interfor has decided not to convert the batch lumber drying kiln DK08 to a continuous drying kiln (DK10). The Permittee has requested a production increase for the batch drying kiln DK08 to 85 MMBF/year. The sawmills permitted production will also increase from 169,219,500 BF/year to 195 MMBF/year. The facility has proposed to add powered stack to each end of the continuous kiln DK09.

Section 2.0: Requirements Pertaining to the Entire Facility

No conditions in Section 2.0 are being added, deleted or modified as part of this permit action.

Section 3.0: Requirements for Emission Units

Emission Units		Specific Limitations/Requirements		Air Pollution Control Devices	
ID No.	**Description**	**Applicable Requirements/Standards**	**Corresponding Permit Conditions**	**ID No.**	**Description**
DK08	Existing lumber drying kiln (batch), direct heated by green sawdust fired gasifier (**85 MMBF/year**)	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b) 391-3-1-.02(2)(e) 391-3-1-.02(2)(g)	3.2.1, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5, 7.14.1, 7.14.2	N/A	None
DK09	Continuous type lumber drying kiln, direct heated by green sawdust fired gasifier (110 MMBF/yr capacity)	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b) 391-3-1-.02(2)(e) 391-3-1-.02(2)(g)	3.2.1, 3.2.2, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 6.2.4	N/A	None
~~DK10*~~	~~Proposed Continuous type lumber drying kiln, direct heated by green sawdust fired gasifier (110MMBF/yr capacity)~~	~~40 CFR 63 Subpart A~~ ~~40 CFR 63 Subpart DDDD~~ ~~391-3-1-.02(2)(b)~~ ~~391-3-1-.02(2)(e)~~ ~~391-3-1-.02(2)(g)~~	~~3.2.1, 3.2.2, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5~~	~~N/A~~	~~None~~
PM01	Planer Mill	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	3.4.1, 3.4.2, 3.5.1, 3.5.2, 5.2.1, 5.2.2, 5.2.3, 5.2.4, 6.1.7, 6.2.4	PMC1	Planer Mill Baghouse

* Kiln DK10 is the ID for the kiln DK08 that was to be converted from a batch kiln to a continuous kiln. This conversion was authorized but never carried out and there is no plan for the conversion of the batch Kiln DK08.

Continuous drying kiln DK10 was removed from the source listing table since the plans to convert batch drying kiln DK08 into continuous drying kiln DK10 has been abandoned and there is no plan to effect this conversion in the near future as of this time. Batch drying kiln DK08's capacity will be increased to 85 MMBF/year via stacking of the lumber and by a change in the product mix without any physical change to the existing batch drying kiln DK08.

Existing Condition 3.2.1 was amended by incorporating the new production limit for the batch drying kiln DK08 and the new increased facility wide production limit of 195 MMBF/year. The production limit of 110 MMBF/year for the continuous kiln DK10 was removed since the conversion has been withdrawn.

Existing Condition 3.2.2, the facility wide production limit of 220 MMBF/year for the continuous kilns DK09 and DK10 was deleted since the new facility wide production limit of 195 MMBF/year for the existing batch kiln DK08 and the continuous kiln DK09 is included in the amended Condition 3.2.1.

New Condition 3.3.2 requires the existing batch drying kiln DK08 to be operated as proposed in the PSD permit application.

Existing Conditions 3.4.1 and 3.4.2 are amended by updating the kiln listing and removing references to the continuous kiln DK10.

New Condition 3.5.3 requires Interfor to develop and implement a Work Practice and Preventive Maintenance Program for the Lumber Drying Kilns D08 and DK09.

Section 4.0: Requirements for Testing

Existing Condition 4.1.3 was amended by adding the relevant test methods for evaluation of VOC emission from the kilns.

No conditions in Section 4.2 are being added, deleted or modified as part of this permit action.

Section 5.0: Requirements for Monitoring

No conditions in Section 5.0 are being added, deleted or modified as part of this permit action.

Section 6.0: Other Recordkeeping and Reporting Requirements

Existing Condition 6.1.7 is amended by updating the facility wide production limit and the production limit on drying kiln DK08. The exceedance condition in 6.1.7b.ii was deleted since batch kiln DK08 will not be converted to continuous kiln DK10.

Existing Condition 6.2.2 is amended by updating the facility wide production limit of kilns DK08 and DK09 each month and notification to EPD when the monthly production exceeds $1/12^{th}$ of the annual production limit.

Existing Conditions 6.2.2.b. and 6.2.5 were deleted since the batch kiln DK08 will not be converted to continuous kiln DK10.

Section 7.0: Other Specific Requirements

No conditions in Section 7.0 are being added, deleted or modified as part of this permit action.

APPENDIX A

Draft Revised Title V Operating Permit Amendment
Interfor U.S. Inc. – Swainsboro Sawmill
Swainsboro (Emanuel County), Georgia

Part 70 Operating Permit Amendment

Permit Amendment No.: 2421-107-0011-V-04-1 Effective Date:

Facility Name: **Interfor U.S. Inc. - Swainsboro Sawmill**

Facility Address 8796 GA Highway 297
Swainsboro, Georgia 30401 (Emanuel County)

Mailing Address: 8796 GA Highway 297
Swainsboro, Georgia 30401

Parent/Holding Company: International Forest Products Limited

Facility AIRS Number: 04-13-107-00011

In accordance with the provisions of the Georgia Air Quality Act, O.C.G.A. Section 12-9-1, et seq and the Georgia Rules for Air Quality Control, Chapter 391-3-1, adopted pursuant to and in effect under the Act, the Permittee described above is issued an amendment to the Part 70 Operating Permit for:

> Increase production from existing direct-fired batch drying Kiln DK08 to 85 MMBF per year, add a powered stack to each end of existing direct-fired continuous drying kiln DK09 and to increase the sawmill capacity to 195 MMBF per year.

This Permit Amendment is conditioned upon compliance with all provisions of The Georgia Air Quality Act, O.C.G.A. Section 12-9-1, et seq, the Rules, Chapter 391-3-1, adopted and in effect under that Act, or any other condition of this Permit Amendment and Permit No. 2421-107-0011-V-04-0. Unless modified or revoked, this Permit Amendment expires simultaneously with Part 70 Permit No. 2421-107-0011-V-04-0.

This Permit Amendment may be subject to revocation, suspension, modification or amendment by the Director for cause including evidence of noncompliance with any of the above; or for any misrepresentation made in Application No. TV-40453 dated November 10, 2015, update of May 17, 2016; any other applications upon which this Permit Amendment or Permit No. 2421-107-0011-V-04-0 are based; supporting data entered therein or attached thereto; or any subsequent submittal or supporting data; or for any alterations affecting the emissions from this source.

This Permit Amendment is further subject to and conditioned upon the terms, conditions, limitations, standards, or schedules contained in or specified on the attached **21** pages.

_____
Director
Environmental Protection Division

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PART 1.0 FACILITY DESCRIPTION

1.3 Process Description of Modification

The Permittee has decided to not convert lumber drying kiln DK08 to a continuous drying kiln (DK-10). The Permittee has requested a production increase for the batch drying kiln DK08 to 85 MMBF/year. The sawmills permitted production will also increase to 195 million BF/year. The facility will also add a powered stack to each end of the direct-fired continuous kiln DK09.

PART 3.0 REQUIREMENTS FOR EMISSION UNITS

Note: Except where an applicable requirement specifically states otherwise, the averaging times of any of the Emissions Limitations or Standards included in this permit are tied to or based on the run time(s) specified for the applicable reference test method(s) or procedures required for demonstrating compliance.

3.1.1 Revised Emission Units

Emission Units		Specific Limitations/Requirements		Air Pollution Control Devices	
ID No.	**Description**	**Applicable Requirements/Standards**	**Corresponding Permit Conditions**	**ID No.**	**Description**
DK08	Existing lumber drying kiln (batch), direct heated by green sawdust fired gasifier (**85 MMBF/year capacity**)	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b) 391-3-1-.02(2)(e) 391-3-1-.02(2)(g)	3.2.1, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5, 7.14.1, 7.14.2	N/A	None
DK09	Continuous type lumber drying kiln, direct heated by green sawdust fired gasifier (110 MMBF/yr capacity)	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b) 391-3-1-.02(2)(e) 391-3-1-.02(2)(g)	3.2.1, 3.2.2, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 6.2.4	N/A	None
~~DK10*~~	~~Proposed Continuous type lumber drying kiln, direct heated by green sawdust fired gasifier (110MMBF/yr capacity)~~	~~40 CFR 63 Subpart A~~ ~~40 CFR 63 Subpart DDDD~~ ~~391-3-1-.02(2)(b)~~ ~~391-3-1-.02(2)(e)~~ ~~391-3-1-.02(2)(g)~~	~~3.2.1, 3.2.2, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 6.1.7, 6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5~~	~~N/A~~	~~None~~
PM01	Planer Mill	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	3.4.1, 3.4.2, 3.5.1, 3.5.2, 5.2.1, 5.2.2, 5.2.3, 5.2.4, 6.1.7, 6.2.4	PMC1	Planer Mill Baghouse

* Generally applicable requirements contained in this permit may also apply to emission units listed above. The lists of applicable requirements/standards and corresponding permit conditions are intended as a compliance tool and may not be definitive.

* Kiln DK10 is the ID for the kiln DK08 that was to be converted from a batch kiln to a continuous kiln. This conversion was authorized but never carried out and there is no plan for the conversion of the batch Kiln DK08.

3.2 Equipment Emission Caps and Operating Limits

Amended Condition

3.2.1 The Permittee shall not dry more than the following specified board feet of lumber per any twelve consecutive months in the lumber drying kilns, under the indicated scenarios.
[PSD/BACT, 40 CFR 52.21 and 391-3-1-.03(2)(c)]

a. The Permittee shall not dry more than 195 million board feet total from both drying kilns DK08 and DK09 or more than 85 million board feet in drying kiln DK08 per any twelve consecutive months.

3.2.2 Condition deleted.

3.4 Equipment SIP Rule Standards

Amended Condition

3.4.1 The Permittee shall not cause, let, suffer, permit, or allow the emission from each lumber drying kilns DK08 and DK09 or the planer mill PM01, any gases which contain particulate matter equal to or exceeding the allowable rate as calculated using the applicable equation below, unless otherwise specified in this Permit.
[391-3-1-.02(2)(e)]

a. $E = 4.1P^{0.67}$ for process input weight rate up to and including 30 tons per hour;

b. $E = 55P^{0.11} - 40$ for process input weight rate in excess of 30 tons per hour.

Where:
E = allowable PM emission rate in pounds per hour;
P = process input weight rate in tons per hour.

3.4.2 The Permittee shall not cause, let, suffer, permit or allow emissions from any lumber drying kilns DK08 and DK09 or the planer mill baghouse PMC1, the opacity of which is equal to or greater than forty percent.
[391-3-1-.02(2)(b)1]

3.5 Equipment Standards Not Covered by a Federal or SIP Rule and Not Instituted as an Emission Cap or Operating Limit

New Condition

3.5.3 The Permittee shall develop and implement a Work Practice and Preventive Maintenance Program for the lumber drying kilns (D08 and DK09) within 120 days from the issuance of this permit. The program shall be subject to review and modification by the Division. At a minimum, the following operational and maintenance checks shall be made and a record of the findings and corrective actions taken, shall be kept in electronic or manual maintenance logs:
[391-3-1-.02(6)(b)1, 40 CFR 52.21, and 40 CFR 70.6(a)(3)(i)]

a. General Work Practice Standards for Wood-Drying Kiln Operation:

i. The lumber kiln drying operation target final moisture content will be 15% or greater based on a 12-month rolling average. Moisture content will be measured with a moisture meter at the outfeed of the planer mill.

ii. Routines for periodic preventative maintenance are detailed in paragraphs b, c, d and e of this condition. With future equipment changes or modifications, these preventative maintenance activities can be modified pending approval from EPD.

b. Daily Routine:

i. Make certain all fans are running properly. If one "trips out" frequently or becomes inoperable, investigate to determine the reason and then document the corrective actions.

ii. Check to verify that the kiln heating system (direct-fired gasifier) is operating properly.

c. Quarterly Routine:

i. Grease fan motors, shafts and bearings and inspect fan blades for damage. Check fan clearances, rotation, tension and replace belts if required.

ii. Inspect kiln walls, doors and baffles for deterioration and schedule repairs as needed.

iii. Inspect temperature monitoring systems for proper operation.

iv. Inspect vents and linkages (batch kiln DK08). Schedule repairs as needed.

v. If necessary sweep out kiln to remove accumulated dust (batch kiln DK08).

vi Inspect and repair as necessary external components of direct-fired gasifier of continuous kiln DK09 and batch kiln DK08.

d. Semi-annual Routine:

i. Verify accuracy of the temperature measurement systems. Repair or replace components as necessary.

ii. During cold shutdown of continuous kiln DK09, inspect and repair as necessary all internal components of kilns and direct-fired gasifiers. During this time the continuous kiln DK09 and burner should be thoroughly cleaned of accumulated dust.

e. Any adverse condition discovered by this inspection shall be corrected in the most expedient manner possible. The Permittee shall record problems discovered in a maintenance log/checklist or the plant's Computerized Maintenance Management System (CMMS), indicating the corrective action(s) taken. If a problem discovered during daily inspection cannot be remedied within 48 hours of discovery, it shall be entered into the plant's Computerized Maintenance Management System (CMMS) as an excursion.

PART 4.0 REQUIREMENTS FOR TESTING

4.1 General Testing Requirements

Amended Condition

4.1.3 Performance and compliance tests shall be conducted and data reduced in accordance with applicable procedures and methods specified in the Division's Procedures for Testing and Monitoring Sources of Air Pollutants. The methods for the determination of compliance with emission limits listed under Sections 3.2, 3.3, 3.4 and 3.5 are as follows:

a. Method 1 for the determination of sample point locations.

b. Method 2 for the determination of stack velocity and volumetric flow rate.

c. Method 3 or 3A for the determination of stack gas molecular weight.

d. Method 3B for the determination of the emission rate correction factor or excess air.

e. Method 4 for the determination of stack gas moisture content.

f. Method 5 in conjunction with Method 202 for the determination of Total Particulate Matter concentration (filterable + condensible).

g. Method 9 and the procedures contained in Section 1.3 of the above reference document for the determination of opacity.

h. ASTM D129, D2622 or D4294 for the determination of fuel sulfur content.

i. The procedures of the NCASI Wood Products Protocol 1 shall be used to determine the VOC concentration from the continuous drying kilns DK08 or DK09.

Minor changes in methodology may be specified or approved by the Director or his designee when necessitated by process variables, changes in facility design, or improvement or corrections that, in his opinion, render those methods or procedures, or portions thereof, more reliable. [391-3-1-.02(3)(a)]

PART 6.0 OTHER RECORD KEEPING AND REPORTING REQUIREMENTS

6.1 General Record Keeping and Reporting Requirements

Amended Condition

6.1.7 For the purpose of reporting excess emissions, exceedances or excursions in the report required in Condition 6.1.4, the following excess emissions, exceedances, and excursions shall be reported:
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. Excess emissions: (means for the purpose of this Condition and Condition 6.1.4, any condition that is detected by monitoring or record keeping which is specifically defined, or stated to be, excess emissions by an applicable requirement)

None required to be reported in accordance with Condition 6.1.4.

b. Exceedances: (means for the purpose of this Condition and Condition 6.1.4, any condition that is detected by monitoring or record keeping that provides data in terms of an emission limitation or standard and that indicates that emissions (or opacity) do not meet the applicable emission limitation or standard consistent with the averaging period specified for averaging the results of the monitoring)

i. Any twelve consecutive month period during which more than 195 million board feet of lumber are dried in the lumber drying kilns DK08 and DK09 and/or more than 85 million board feet in drying kiln DK08.

ii. Deleted.

c. Excursions: (means for the purpose of this Condition and Condition 6.1.4, any departure from an indicator range or value established for monitoring consistent with any averaging period specified for averaging the results of the monitoring)

i. Any adverse condition(s) discovered by the weekly inspections, as required in Condition No. 5.2.2, of the planer mill shaving system cyclone and baghouse PMC1.

ii. Any two consecutive required daily determinations of visible emissions from the same source requiring action by Condition 5.2.3.

6.2 Specific Record Keeping and Reporting Requirements

Amended Condition

6.2.2 The Permittee shall notify the Division in writing if the amount of dried lumber processed through all drying kilns exceeds the following specified limits. This notification shall be postmarked by the fifteenth day of the following month and shall include an explanation of how the Permittee intends to maintain compliance with the limit in Condition No. 3.2.1. [391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. 16.25 MMBF, during any calendar month, through drying kilns DK08 and DK09 combined or 7.08 MMBF during any calendar month, through drying kiln DK08.

b. condition deleted.

6.2.5 Condition deleted.

APPENDIX B

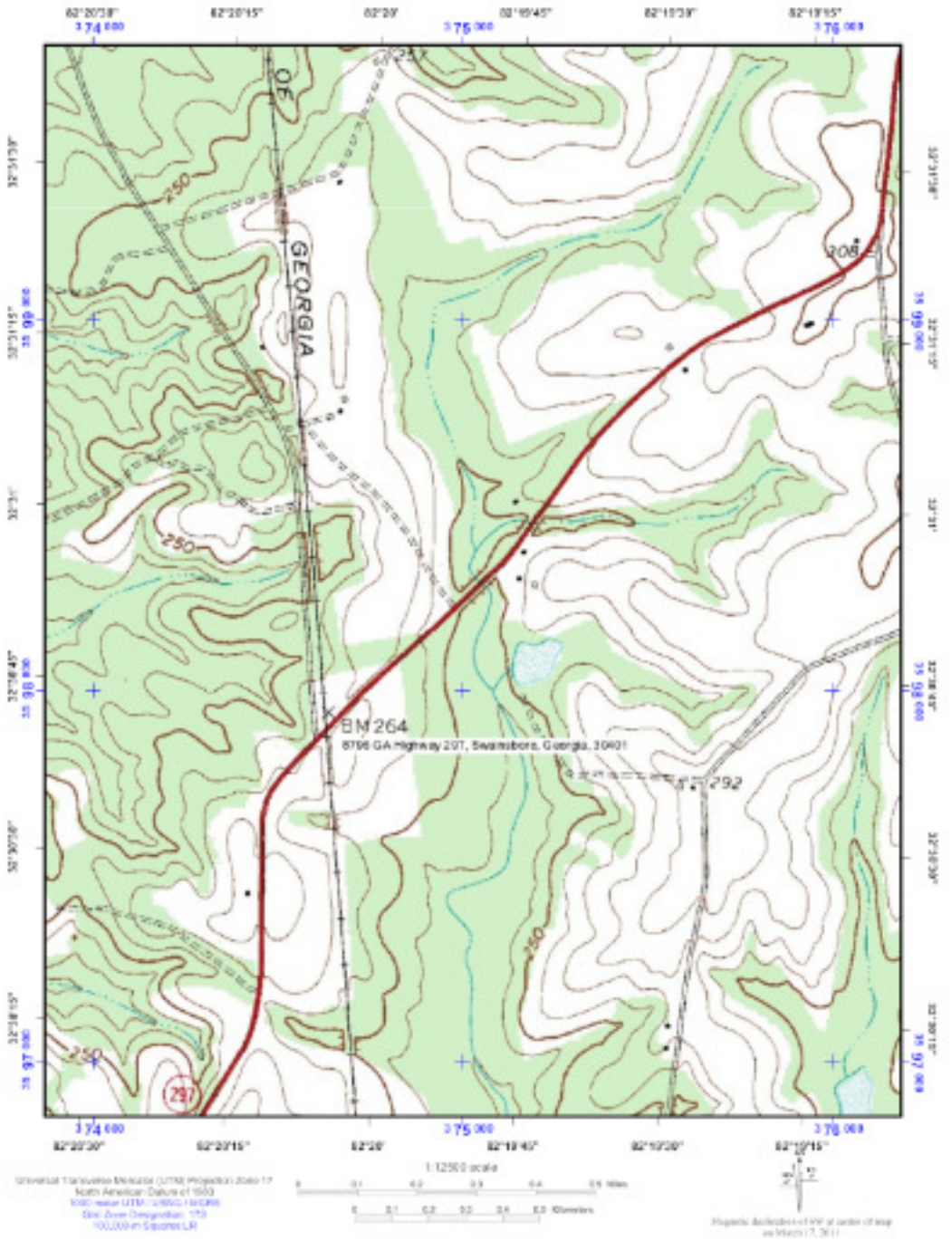
Interfor U.S. – Swainsboro Sawmill PSD Permit Application and Supporting Data

Contents Include:

1. PSD Permit Application No. TV-40453, dated May 17, 2016

FIGURE
1
FACILITY PLOT PLAN
AND AREA MAP


297
Planer Mill
Crane
Sawmill
Building
Sorter
New
DK010
DK008
DK009


GEORGIA
BM 264
6796 GA Highway 207, Swainsboro, Georgia, 30401
292
208
297
250

APPENDIX C

EPD'S PSD Dispersion Modeling and Air Toxics Assessment Review

Georgia Department of Natural Resources
Environmental Protection Division • Air Protection Branch
4244 International Parkway • Suite 120 • Atlanta • Georgia 30354
404/363-7000 • Fax: 404/363-7100
Judson H. Turner, Director

MEMORANDUM

January 29, 2016

To: Manny Patel, Seetharaman Ganapathy
Thru: James Boylan
From: Yan Huang

Subject: PSD and Toxics Modeling Review for Interfor U.S. Inc. - Swainsboro Sawmill Modification Project, Swainsboro, Emanuel County, GA

GENERAL INFORMATION

Interfor U.S. Inc. - Swainsboro Sawmill (Interfor) proposed to increase production in its existing batch kiln (DK08) by changing the product mix and the way the facility stacks lumber in the kiln. The facility also proposed to add a powered stack to each end of its continuous kiln (DK09) to control the toxic air pollutants (TAPs) emission. The project will result in an increase of VOC emission. Air dispersion modeling for this modification application was conducted by Interfor's consultant, Koogler and Associates, Inc., to assess conformance of proposed emission limits for the subject emission point sources on site with the Georgia Air Toxics Guideline and the applicable federal Prevention of Significant Deterioration (PSD) air quality standards.

This memo discusses the procedures used to review the supporting dispersion modeling. VOC is the only pollutant with projected emissions in excess of the Significant Emission Rate (SER). Ozone ambient impact analysis over the project area shows no adverse impacts from the proposed project VOC emissions. The air toxic impacts of the 10 most significant Toxic Air Pollutants (TAPs) from the proposed project do not exceed their applicable Acceptable Ambient Concentrations (AACs) except for the Formaldehyde and Acrolein at the annual averaging period. However, a site specific risk assessment was performed and the annual averaged maximum ground-level concentration (MGLC) does not exceed the ACC at any residential locations. The results of these modeling evaluations are summarized in the following sections of this memorandum.

INPUT DATA

1. Meteorological Data – The hourly meteorological data used in this review were obtained from Augusta Daniel Field NWS surface station and Peachtree City NWS upper air station, GA, for the period of 2007-2011. The data were processed using the AERMET (v. 12345) and provided by GA EPD (http://www.georgiaair.org/airpermit/html/sspp/modeling/aermetdata.htm).

2. **Source Data** – Emission unit physical parameters, criteria and TAP emission rates were provided by the applicant and have been subjected to GA EPD engineering review. Tables in the updated modeling report (dated on Jan. 13, 2016) summarized modeled point source parameters and the facility-wide TAP emission from the proposed project. The emissions from Dry Kiln (DK08) come from several vents located along the top of the building that houses the kiln. Following the GA EPD's recommendation, the emissions from DK08 were consolidated into a single central vent using an 'effective area' approach. The emissions from the continuous Dry Kiln (DK09) were suggested to split on an 80/20 basis with 80% of the emissions being discharged from the powered stack and 20% out the kiln doors. For horizontal discharge through the each end of the kiln door, GA EPD recommended to set the exit velocity of 0.001 m/s. However the applicant used the exit velocity of 0.026 m/s derived from the kiln door dimensions and gas exit flow rate. (http://www3.epa.gov/ttn/scram/models/aermod/aermod_userguide_addendum_v11059_draft.pdf)

3. **Receptor Locations** – Discrete receptors with 50-meter intervals were placed on a Cartesian grid along the fence-line. Receptors extend outwards from the fence line at 50-meter intervals to approximately 500 meters and at 100-meter intervals to approximately 1 kilometer. This domain is sufficient to capture the maximum impact. In addition, six discrete receptors were added, representing a county solid waste facility and five nearby residences.

4. **Terrain Elevation** – Topography was found to be generally flat in the site vicinity. Terrain data from USGS 1-sec National Elevation Dataset (NED) CONUS were extracted to obtain the elevations of all sources and receptors by AERMAP terrain processor (version 11103). The resulting elevation data were verified by comparing contoured receptor elevations with USGS 7.5-minute topographic map contours.

5. **Building Downwash** – GEP building downwash analysis files were provided by Koogler and Associates, and were based on the scaled site plan included in the application using the BPIPPRM program (version 04274). The BPIPPRM model was used to derive building dimensions for downwash assessment and the assessment of cavity-region concentrations appropriate for the AERMOD model.

6. **Class I Areas** – Three Class I areas exist within a 300 km range from Interfor facility, these are: Wolf Island, Okefenokee, and Cape Romain Wilderness Areas. Among these, Wolf Island Wilderness Area is the closest, located approximately 154 km south from the facility. There are no PSD increments or air quality related values for VOC. Therefore, a Class I area PSD review is not required.

CLASS II AREA IMPACT ANALYSIS

VOC is the only criteria pollutant with emissions greater than the SER (40 tpy), therefore neither Class II area significant impact analysis, nor monitoring *De Minimis* concentration analysis are

required. In addition, the potential soil and vegetation impacts and the Class II visibility analysis are not required.

Ozone Impact Analysis

Since no significant air quality concentration has been established for ozone impact analysis, PSD permit applicants with a proposed net emission increase of 100 tons/year or more of VOC and/or NOx are required to conduct an ambient air impact analysis that includes pre-application monitoring data to determine the current state of the ambient air conditions for this pollutant.

The proposed Interfor Swainsboro modification is expected to emit 413.3 tpy VOC. There are no ozone monitors in Emanuel County. The nearest ozone monitor to the Interfor Swainsboro Sawmill is located approximately 106 km north-northeast at Augusta, Richmond County, GA (site ID: 13-245-0091). The next nearest ozone monitor is located approximately 118 km northwest of the Swainsboro Sawmill in Macon, Bibb County, GA (site ID: 13-021-0012). Both monitors were chosen to review due to the proximity of the monitor and prevailing downwind direction relative to the Swainsboro Sawmill. The applicant examined the 3-year rolling average ozone concentration at both monitors. The latest three-year design value (2012-2014) average of 4^{th} high 8-hour ozone values is 65 ppb for Augusta site and 67 ppb for Macon site. This area is in attainment with the 2008 8-hour ozone standard (75 ppb) and the new 2015 8-hour ozone standard (70 ppb).

AIR TOXICS ASSESSMENT

The proposed facility will emit 10 TAPs: Acrolein, Acetaldehyde, Benzene, Formaldehyde, Methanol, MIK, o-Xylene, Phenol, Propionaldehyde, and Toluene. The annual, 24-hour, and 15-minute AACs of the TAPs were reviewed based on U.S. EPA IRIS reference concentration (RfC), OSHA Permissible Exposure (PEL), ACGIH Threshold Limit Values (TLV) including STEL (short term exposure limit) or ceiling limit, and NIOSH Recommended Standards (REL) according to the Georgia Air Toxics Guideline. The modeled MGLCs were calculated using the AERMOD dispersion model (version 15181) for 1-hour, 24-hour, and annual averaging periods.

Tables 1 and 2 summarize the AAC levels and MGLCs of the TAPs from the updated modeling report dated on Jan 13, 2016. The maximum 15-min impact is based on the maximum 1-hour modeled impact multiplied by a factor of 1.32. GA EPD remodeled the impact of two TAPs - Formaldehyde and Acrolein using 0.001 m/s for horizontal emission via kiln doors. The results show that the MGLCs increase by 10-15% at annual and 24-hour averaging periods and 25-35% at 15-min averaging period, listed in parentheses in Tables 1 and 2. The modeled MGLCs for all TAPs are below their respective AAC levels except for the MGLC of Formaldehyde and Acrolein at the annual averaging period. According to Georgia Air Toxics Guideline, a site specific risk assessment is required to be conducted by the applicant if the modeled MGLC of any TAP is greater than the AAC level.

Tables 1 and 2 include the MGLCs at the county solid waste facility and highest of 5 nearby residences.

Figure 1 and 2 show that the Company is located in a rural area. Orange dots represent five nearby residences and the blue dot represents the county solid waste facility. As seen in Figure 1 and 2, the modeled maximum annual concentration for Formaldehyde and Acrolein did not

exceed the corresponding AAC at any nearby residences or at the county solid waste facility. Therefore, the applicant passes the site specific risk assessment and meets the applicable Georgia Air Toxics Guideline.

Table 1. Modeled MGLCs and the Respective AACs at Annual and 24-hr Averaging Periods

TAP	Averaging Period	AAC [µg/m^3]	MGLC [µg/m^3]	County Solid Waste Facility [µg/m^3]	Highest of 5 Nearby Residences [µg/m^3]
Methanol	24-hr	619	49.8	12.6	10.5
Formaldehyde	Annual	1.1	1.64 (**1.88**)	0.342 (0.39)	0.205 (0.224)
Phenol	24-hr	45.2	2.66	0.673	0.559
Acetaldehyde	Annual	4.55	1.05	0.216	0.130
Acrolein	Annual	0.15	0.149 (**0.174**)	0.031 (0.036)	0.019 (0.020)
Propionaldehyde	Annual	8	0.073	0.015	0.009
MIK	Annual	3,000	0.057	0.012	0.007
Benzene	Annual	0.13	0.012	0.003	0.002
o-Xylene	Annual	100	0.005	0.001	0.001
Toluene	Annual	5,000	0.002	0.000	0.000

Table 2. Modeled MGLCs and the Respective AACs at 15-min Averaging Period

TAP	Averaging Period	AAC [µg/m^3]	MGLC [µg/m^3]	County Solid Waste Facility [µg/m^3]	Highest of 5 Nearby Residences [µg/m^3]
Methanol	15-min	32,800	241	127	129
Formaldehyde	15-min	245	81.4 (103.3)	44.2 (56.8)	43.5 (45.7)
Phenol	15-min	6,000	12.9	6.78	6.90
Acetaldehyde	15-min	4,500	52.6	27.7	28.2
Acrolein	15-min	23	7.50 (9.78)	3.95 (5.35)	4.02 (4.24)
Propionaldehyde	15-min	NA	3.67	1.93	1.96
MIK	15-min	30,700	2.87	1.51	1.53
Benzene	15-min	1,600	0.612	0.32	0.33
o-Xylene	15-min	65,500	0.272	0.14	0.14
Toluene	15-min	113,000	0.116	0.06	0.06

CONCLUSIONS

The air quality analysis reviewed and described in the above sections demonstrates the conformance of the project's air pollutant impacts with Class I and Class II PSD NAAQS regulations and GA EPD's Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions. The additional air quality impact on soil, vegetation, and visibility is expected to be very minimal.

For these reasons, it is recommended a permit to be issued based on the project design and operating hours described in the application.

Figure 1. Google Earth Map for Interfor Swainsboro Sawmill. Contours show the concentration of the annual averaged Formaldehyde concentration (µg/m^3). Orange dots represent five nearby residences and the blue dot represents the county solid waste facility.

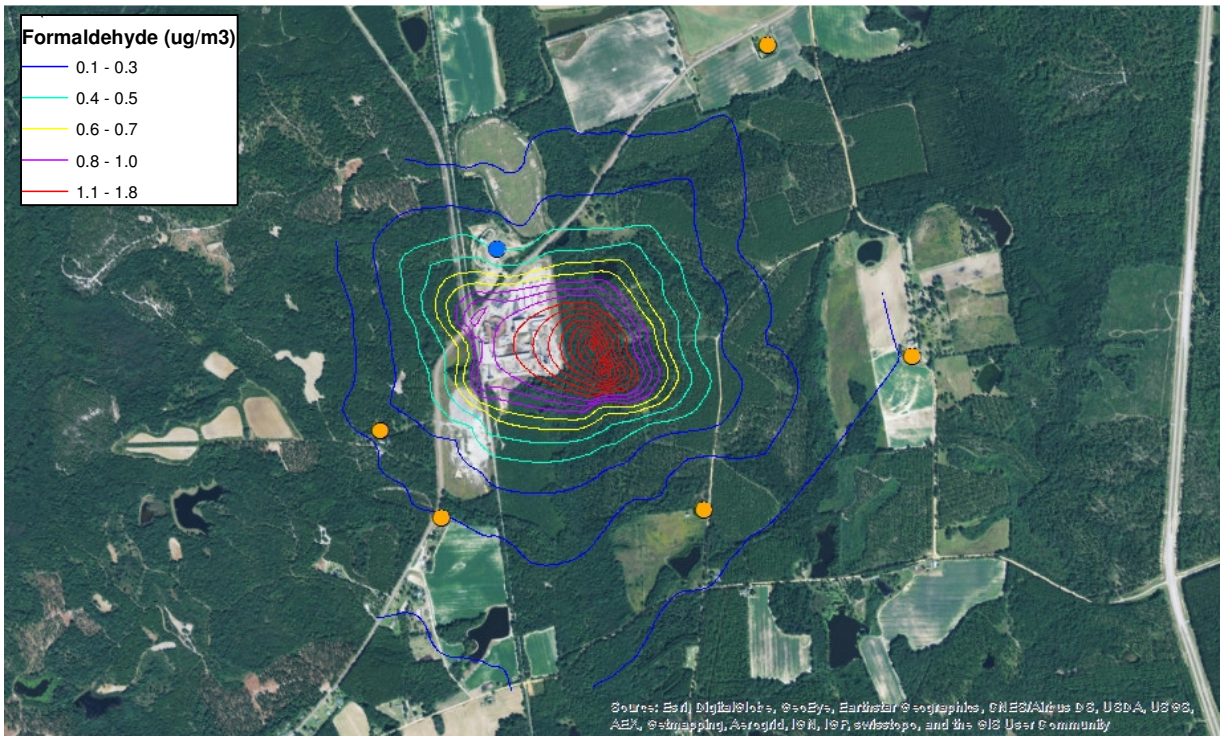
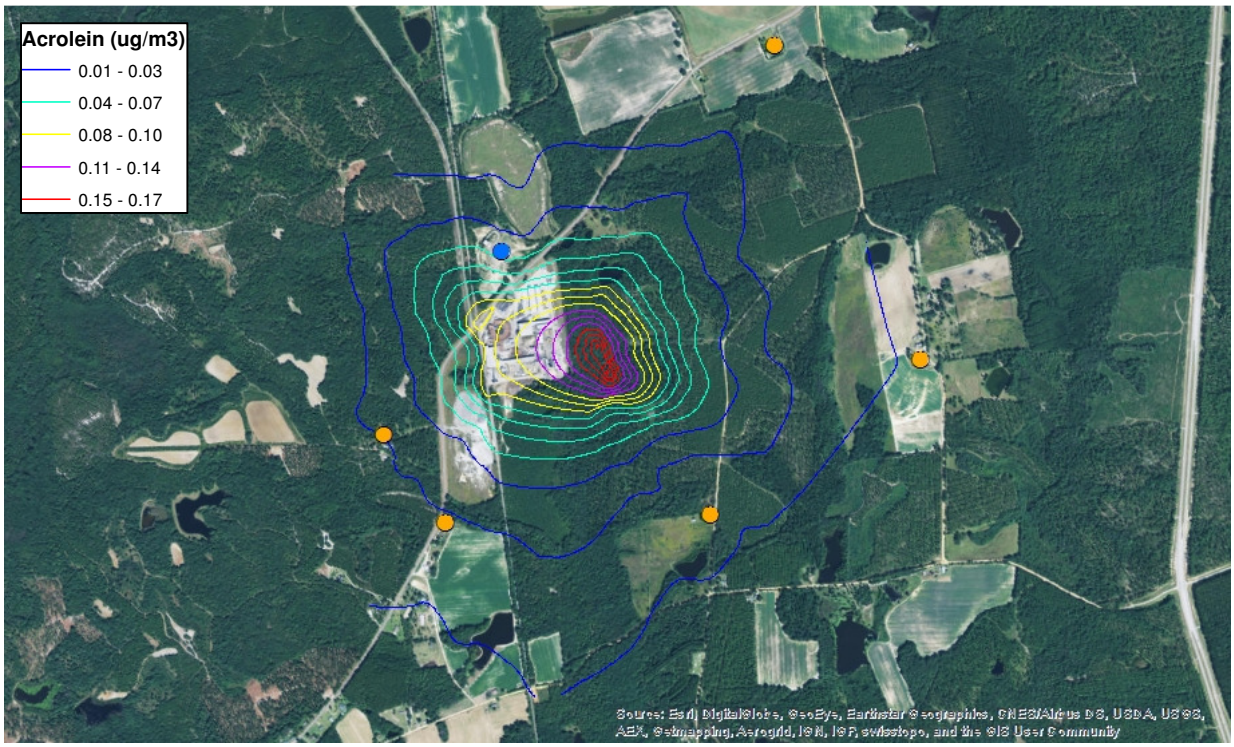


Figure 2. Google Earth Map for Interfor Swainsboro Sawmill. Contours show the concentration of the annual averaged Acrolein concentration (µg/m^3). Orange dots represent five nearby residences and the blue dot represents the county solid waste facility.


Acrolein (ug/m3)
0.01 - 0.03
0.04 - 0.07
0.08 - 0.10
0.11 - 0.14
0.15 - 0.17
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community